ZERO IF COMPLEX QUADRATURE FREQUENCY DISCRIMINATOR & FM DEMODULATOR

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ABSTRACT OF THE DISCLOSURE

A frequency discriminators (FD) and frequency modulation (FM) demodulators, utilizing single sideband (SSB) complex conversion directly to zero IF, suitable for direct demodulation at high frequencies of analog FM or digital FSK modulated signals, as well as for high speed frequency discrimination (or frequency comparison) in applications such as frequency acquisition in frequency synthesizers. The complex SSB down-converter consists of a quad of mixers and quadrature splitters in both the signal path and local oscillator (LO) path. Each mixer receives both the signal and the LO, each either in-phase or quadrature. The outputs of mixers are combined in pairs, to produce the SSB in-phase (I) baseband signal and the SSB quadrature (Q) baseband signal. Both I and Q signals are then delayed, each multiplied by un-delayed version of the other one. The multiplication products are summed together, to produce an FD error signal, or an FM demodulated signal at the output. The delay time can be dynamically controlled, in order to set the FD frequency range or to adjust the gain of the FM demodulator.